

Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the subject application:

Claims 1-13 (canceled).

14. (currently amended) A magnetic resonance imaging apparatus comprising:

a static magnetic field generating unit that generates a homogeneous static magnetic field in an inspection space;

a gradient magnetic field generating unit that generates a magnetic field strength gradient;

a high frequency magnetic field generating unit;

a detecting unit that detects nuclear magnetic resonance signals generated from an object to be examined;

a display unit that displays an image as a result based on the detection;

a temperature detecting unit that detects a temperature of said static magnetic field generating unit and/or surrounding thereof;

a magnetic field correcting unit that generates an additional magnetic field that corrects non-uniformity of the distribution of said static magnetic field within said inspection space being caused by temperature change of said static magnetic field generating unit and/or surrounding space of it; and

a control unit that controls said magnetic field correcting unit based on the temperature detected by said temperature detecting unit,

wherein a spatial distribution of said additional magnetic field is adjusted based on the temperature detected by said temperature

detecting unit.

15. (previously presented) A magnetic resonance imaging apparatus according to claim 14,

wherein the control unit has a temperature setting unit that sets a temperature detected by the temperature-detecting unit.

16. (previously presented) A magnetic resonance imaging apparatus according to claim 14,

wherein the temperature detecting unit detects temperatures of at least two positions.

17. (previously presented) A magnetic resonance imaging apparatus according to claim 14,

wherein the magnetic field correcting unit comprises a shim coil for generating an additional magnetic field and a shim power source that supplies a current to the shim coil.

18. (previously presented) A magnetic resonance imaging apparatus according to claim 14,

wherein the control unit comprises a voltage generating unit that generates a voltage corresponding to a non-uniformity component of the magnetic field at the temperature detected by the temperature detecting unit, a voltage/current converter that converts the voltage output by the voltage generating unit to current, and a supplying unit that supplies to the magnetic field correcting unit the current generated from the voltage/current converter.

19. (previously presented) A magnetic resonance imaging apparatus according to claim 14,

wherein the magnetic field correcting unit generates at least one additional magnetic field of linear term of y, quadratic term of z and quartic term of z, where z is the direction of the static magnetic field and y is one direction orthogonal to z.

20. (previously presented) A magnetic resonance imaging apparatus according to claim 14,

wherein the temperature detecting unit is disposed near the static magnetic field generating unit and/or in a room where the static magnetic field generating unit is placed.

21. (currently amended) A method for maintaining uniformity of a static magnetic field generated by a static magnetic field generating unit in a magnetic resonance imaging apparatus, by generating an additional magnetic field, the method comprising the steps of:

calculating a temperature dependence of non-uniformity of distribution of the static magnetic field in an inspection space for an object to be examined, said non-uniformity distribution of the static magnetic field being caused by temperature change of the static magnetic field generating unit and/or surrounding thereof; and

detecting a temperature of the static magnetic field generating unit and/or surroundings thereof; and

generating the additional magnetic field having a magnetic field distribution that corrects said nonuniformity of the distribution of the static magnetic field within said inspection space,

wherein the spatial distribution of the additional magnetic field

is adjusted based on the detected temperature.

22. (currently amended) A magnetic resonance imaging apparatus comprising:

a static magnetic field generating means that generates a homogeneous static magnetic field in an inspection space; and

a uniformity correcting means that detects temperature change affecting the uniformity of the distribution of the static magnetic field generated by the static magnetic field generating means and that generates an additional static magnetic field that cancels non-uniformity of the distribution of the static magnetic field within said inspection space based on the detected temperature change,

wherein a spatial distribution of said additional static magnetic field is adjusted based on the temperature change detected by said uniformity correcting means.

23. (currently amended) A magnetic resonance imaging apparatus comprising:

a static magnetic field generating unit that generates a static magnetic field of a predetermined intensity, said static magnetic field generating unit comprising a pair of superconducting coils and a pair of cryostats each accommodating one of said pair of superconducting coils;

a supporting means that supports said pair of cryostats as being apart so as to form an inspection space for an object to be examined;

a gradient magnetic field generating unit that generates a magnetic field having an intensity gradient;

means that generates a high frequency magnetic field;

means that detects nuclear magnetic resonance signals generated from said object;

means that processes said nuclear magnetic resonance signals and that displays the processed results;

a temperature detecting unit that detects a temperature of said static magnetic field generating unit and/or said support means and/or surroundings surrounding space thereof;

a magnetic field correcting unit that generates an additional magnetic field that corrects non-uniformity of the distribution of said static magnetic field within said inspection space being caused by temperature change of said static magnetic field generating unit and/or said support means and/or surrounding space ~~of it~~ thereof; and

a control unit that controls said magnetic field correction unit based on the temperature detected by said temperature detecting unit, wherein a spatial distribution of said additional magnetic field is adjusted based on the temperature detected by said temperature detecting unit.

24. (previously presented) A magnetic resonance imaging apparatus according to claim 23,

wherein the control unit has a temperature setting unit that sets a temperature detected by the temperature-detecting unit.

25. (previously presented) A magnetic resonance imaging apparatus according to claim 23,

wherein the temperature detecting unit detects temperatures of at least two positions.

26. (currently amended) A magnetic resonance imaging apparatus according to claim 23,

wherein the magnetic field correcting unit comprises a shim coil for generating an additional magnetic field and a shim power source that supplies a current to the shim coil directed by said control unit.

27. (previously presented) A magnetic resonance imaging apparatus according to claim 23,

wherein the control unit comprises a voltage generating unit that generates a voltage corresponding to a non-uniformity component of the magnetic field at the temperature detected by the temperature detecting unit, a voltage/current converter that converts the voltage output by the voltage generating unit to current, and a supplying unit that supplies to the magnetic field correcting unit the current generated from the voltage/current converter.

28. (previously presented) A magnetic resonance imaging apparatus according to claim 23,

wherein the magnetic field correcting unit generates at least one additional magnetic field of linear term of y, quadratic term of z and quartic term of z, where z is the direction of the static magnetic field and y is one direction orthogonal to z.

29. (previously presented) A magnetic resonance imaging apparatus according to claim 23,

wherein the temperature detecting unit is disposed near the static magnetic field generating unit and/or in a room where the static magnetic field generating unit is placed.

30. (currently amended) A magnetic resonance imaging apparatus comprising:

a static magnetic field generating unit that generates a static magnetic field of a predetermined intensity, said static magnetic field generating unit including a pair of superconducting coils;

a supporting means that supports said pair of superconducting coils as being apart so as to form an inspection space for an object to be examined;

a gradient magnetic field generating means that generates a magnetic field having an intensity gradient;

means that generates a high frequency magnetic field;

means that detects nuclear magnetic resonance signals generated from said object;

means that processes said nuclear magnetic resonance signals and that displays the processed results;

a temperature detecting unit that detects a temperature of said static magnetic field generating unit and/or surroundings thereof support means;

a magnetic field correcting unit that generates an additional magnetic field for correcting non-uniformity of the distribution of said static magnetic field within said inspection space being caused by deformation of said supporting means due to the temperature change of said static magnetic field generating unit and/or surrounding space of it thereof; and

a control unit that controls said magnetic field correction unit based on the temperature detected by said temperature detecting unit, wherein a spatial distribution of said additional magnetic field

is adjusted based on the temperature detected by said temperature detecting unit.

31. (currently amended) A magnetic resonance imaging apparatus according to any one of claims 14, 23 and 30,

wherein said apparatus further comprises means that calculates a temperature dependence of non-uniformity of distribution of the static magnetic field in the inspection space, said non-uniformity distribution of the static magnetic field being caused by temperature change of the static magnetic field generating unit and/or surroundings surrounding space thereof;

means that holds a control data that corrects the non-uniformity of the distribution of the static magnetic field corresponding to the temperature; and

means that outputs the control data being selected from said control data holding means based on the detected temperature into said control unit.

32. (new) A magnetic resonance imaging apparatus according to claim 23 or 30, further comprising a connection pipe for connecting the pair of cryostats,

wherein said temperature detecting unit also detects a temperature of the connection pipe and said control unit controls the magnetic field correcting unit based also on the temperature of the connection pipe.

33. (new) A magnetic resonance imaging apparatus according to claim 32,

wherein said control unit controls the magnetic field correcting unit based on the temperature of the supporting means and the temperature difference between the supporting means and the connection pipe.

34. (new) A magnetic resonance imaging apparatus according to claim 33,

wherein said control unit finds and adds the correction value for a static magnetic field non-uniformity component caused by the temperature of the supporting means and the correction value for a static magnetic field non-uniformity component caused by the temperature difference between the supporting means and the connection pipe, and

controls the magnetic field correcting unit based on the sum of the correction values.

35. (new) A magnetic resonance imaging apparatus comprising:
a static magnetic field generating unit that generates a static magnetic field of a predetermined intensity in an inspection space, said static magnetic field generating unit comprising a pair of permanent magnets;

a supporting means that supports said pair of permanent magnets as being apart so as to form an inspection space for an object to be examined;

a gradient magnetic field generating unit that generates a magnetic field having an intensity gradient;

means that generates a high frequency magnetic field;

means that detects nuclear magnetic resonance signals generated

from said object;

means that processes said nuclear magnetic resonance signals and that displays the processed results;

a temperature detecting unit that detects a temperature of at least one of said static magnetic field generating unit, support means and surrounding space of them;

a magnetic field correcting unit that generates an additional magnetic field that corrects non-uniformity of the distribution of said static magnetic field within said inspection space being caused by temperature change of said static magnetic field generating unit and/or said support means and/or said surrounding space of them; and

a control unit that controls said magnetic field correction unit based on the temperature detected by said temperature detecting unit,

wherein a spatial distribution of said additional magnetic field is adjusted based on the temperature detected by said temperature detecting unit.